IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

AMPEX CORPORATION, *Plaintiff,* v. EASTMAN KODAK COMPANY, ALTEK CORPORATION, and CHINON INDUSTRIES, INC., *Defendants.*	C.A. No. 04-1373 (KAJ) **REDACTED VERSION**

DECLARATION OF KAREN A. CHRISTIANSEN
IN SUPPORT OF MOTION FOR PARTIAL SUMMARY JUDGMENT
THAT U.S. PATENT NO. 4,821,121 IS NOT ANTICIPATED

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AMPEX CORPORATION, *Plaintiff,* v. EASTMAN KODAK COMPANY, ALTEK CORPORATION, and CHINON INDUSTRIES, INC., *Defendants.*	)	C.A. No. 04-1373-KAJ REDACTED

DECLARATION OF KAREN A. CHRISTIANSEN IN SUPPORT OF MOTION FOR PARTIAL SUMMARY JUDGMENT THAT U.S. PATENT NO. 4,821,121 IS NOT ANTICIPATED

I am an associate with the law firm of Ropes & Gray LLP, attorneys for plaintiff Ampex Corporation ("Ampex") in this action. I make this declaration in support of Ampex's Motion for Summary Judgment That U.S. Patent No. 4,821,121 Is Not Anticipated.

1. Attached hereto as Exhibit 1 is a true and correct copy of U.S. Patent No. 4,821,121, granted April 11, 1989.

2. Attached hereto as Exhibit 2 are true and correct copies of selected pages from the Initial Expert Report of Richard John Taylor, submitted in this action on March 24, 2006.

3. Attached hereto as Exhibit 3 are true and correct copies of selected pages from the prosecution history for U.S. Patent No. 4,821,121, including: Office Action dated December 21, 1984 (Paper 3) at Tab A; Amendment, dated January 28, 1986

(Paper 13) at Tab B; Office Action dated May 23, 1986 (Paper 14) at Tab C; and Preliminary Amendment, dated February 24, 1987 (Paper 25) at Tab D.

4. Attached hereto as Exhibit 4 is a true and correct copy of selected pages from the Quantel Limited DLS 6000/1 Operating Instructions, dated 1983, and bearing Bates numbers AX203954-957, 964-983.

5. Attached hereto as Exhibit 5 is a true and correct copy of selected pages from the Quantel DPB 7001 Paint Box User Guide, dated 1983, and bearing Bates numbers EKC001019638-641, 661-665, and 674-679.

6. Attached hereto as Exhibit 6 are true and correct copies of selected pages from the Deposition of Richard J. Taylor, taken in the ITC action on June 6, 2005.

7. Attached hereto as Exhibit 7 are true and correct copies of selected pages from the Deposition of Richard J. Taylor, taken in this action on April 28, 2006.

8. Attached hereto as Exhibit 8 are true and correct copies of selected pages from the Initial Expert Report of Dr. Dieter Preuss, submitted in this action on March 23, 2006.

9. Attached hereto as Exhibit 9 are true and correct copies of selected pages from the Deposition of Dieter W. Preuss, Ph.D., taken in this action on May 5, 2006.

10. Attached hereto as Exhibit 10 is a true and correct copy of a document entitled "An Update on Laser Imaging for the Graphic Arts," by S. Thomas Dunn, Ph.D., bearing Bates numbers EKC000142038-066.

11. Attached hereto as Exhibit 11 are true and correct copies of selected pages from the Deposition of Brad A. Myers., taken in this action on May 3, 2006.

12. Attached hereto as Exhibit 12 are true and correct copies of selected pages from the Deposition of Christopher F. Herot, taken in the ITC action on June 15, 2005.

13. Attached hereto as Exhibit 13 are true and correct copies of selected pages from the Initial Expert Report of Dr. Brad A. Myers, submitted in this action on March 24, 2006.

14. Attached hereto as Exhibit 14 is a true and correct copy of U.S. Patent No. 4,802,019.

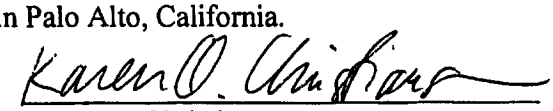
15. Attached hereto as Exhibit 15 are true and correct copies of selected pages from the Deposition of Yoshiji Harada, taken in this action on February 17, 2006.

16. Attached hereto as Exhibit 16 is a true and correct copy of an article entitled "Electronic Image Processing in Reprotechnology," by Eberhard Hennig, bearing Bates numbers EKC000142077-081.

17. Attached hereto as Exhibit 17 is a true and correct copy of an article entitled "The Hell Chromacom: A Tool for Today, A Vision for Tomorrow," dated December 13, 1982, bearing Bates numbers EKC000142124-135.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on May 23, 2006 in Palo Alto, California.



Karen A. Christiansen

EXHIBIT 1

U 1167518

THE UNITED STATES OF AMERICA

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

May 07, 2004

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THIS OFFICE OF:

U.S. PATENT: ***4,821,121***
ISSUE DATE: ***April 11, 1989***

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

J. Lawrence

T. LAWRENCE
Certifying Officer

United States Patent [19]

Beaulier

[11] **Patent Number: 4,821,121**

[45] **Date of Patent: Apr. 11, 1989**

[54] **ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION**

[75] Inventor: **Daniel A. Beaulier, Menlo Park, Calif.**

[73] Assignee: **Ampex Corporation, Redwood City, Calif.**

[21] Appl. No.: **18,786**

[22] Filed: **Feb. 24, 1987**

Related U.S. Application Data

[63] Continuation of Ser. No. 740,297, May 31, 1985, abandoned, which is a continuation of Ser. No. 483,327, Apr. 8, 1983, abandoned.

[51] Int. Cl.[4] H04N 5/14

[52] U.S. Cl. 358/160; 358/183

[58] Field of Search 358/160, 183, 311, 342, 358/102; 360/35.1, 9.1, 10.1, 14.1

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,152,722	5/1979	Inuiya et al.	358/102
4,172,264	10/1979	Taylor et al.	358/185
4,302,776	11/1981	Taylor et al	358/160

FOREIGN PATENT DOCUMENTS

0051305 5/1982 European Pat. Off. 360/14.1

OTHER PUBLICATIONS

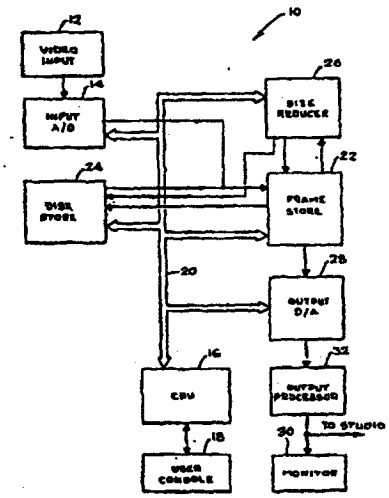
Hugh Boyd, "The DLS6000—A New Digital Still Store Library System", International Broadcast Engineer, vol. 11, No. 170, pp. 46–48.

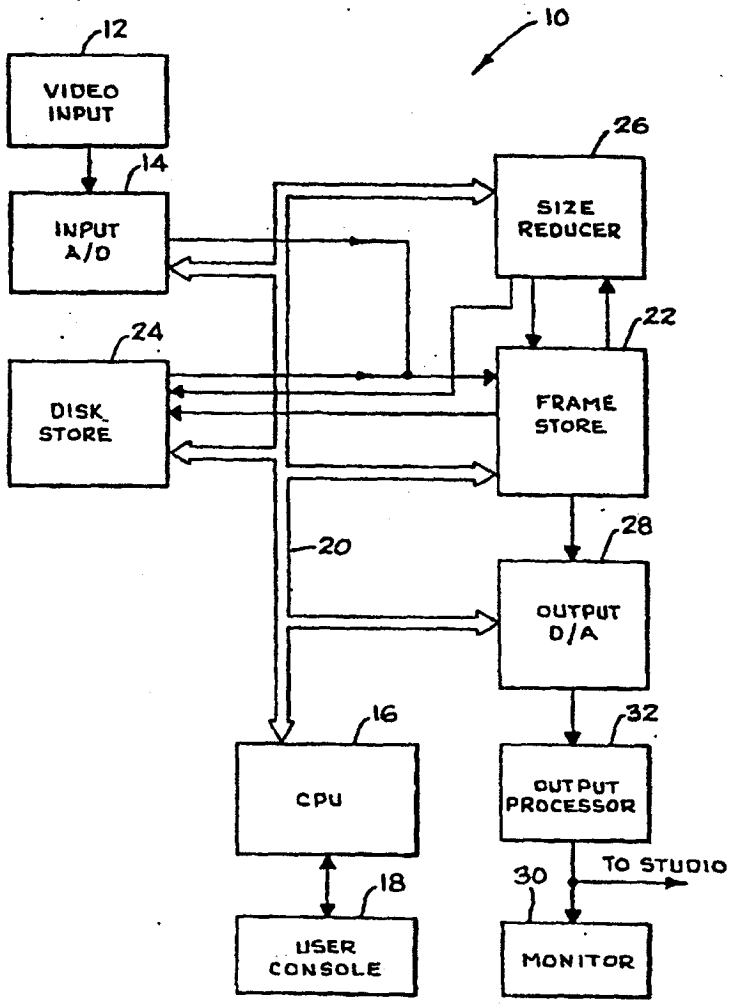
Primary Examiner—Edward L. Coles, Sr.
Assistant Examiner—David E. Harvey
Attorney, Agent, or Firm—Bradley A. Perkins; Ronald C. Fish; George B. Almeida

[57] **ABSTRACT**

An electronic still store system stores and selectively outputs video image data defining a plurality of signal frame still images. The simultaneous display of up to 16 or more quarter sized images for scanning or sorting by an operator is facilitated by generating a quarter sized copy of each newly received image frame and storing both together on a conventional magnetic disk storage device as is typically employed in general purpose digital computing systems. The quarter sized image can then be recalled directly for a multi-image scan or sort function in which 16 reduced size images are displayed simultaneously without the time delays associated with the retrieval and size reduction of 16 full size images.

15 Claims, 1 Drawing Sheet





ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION

This is a continuation of application Ser. No. 740,297, filed on May 31, 1985, now abandoned, which is a continuation of application Ser. No. 483,327, filed Apr. 8, 1983, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a digital electronic still store for broadcast television signals and more particularly to a still store providing a high speed multiimage scan or sort capability.

Digital electronic still store video display systems store a plurality of frames of video images on relatively low cost magnetic disk storage. Any selected one of the stored image frames may then be communicated to a frame store from which data defining the image is repetitively read out to generate a continuously displayed television image. The still store image can then be combined with a second image to create a combined video image. For example, it is common to insert a selected still store image depicting a news event in the upper left hand corner of a live studio image depicting a newscaster describing the news event.

The disk store is capable of storing a large library of single frame images and it is often desirable to generate a reduced size multiple image picture for editing or other purposes. For example, it might be desirable to create a special effect with multiple images or an editor may wish to view and compare several images at the same time for the purpose of selecting those images which will be used in a television broadcast. However, each of the several images which are to be simultaneously displayed must first be read from the disk store as full size images and then reduced for insertion into the multi-image display. This process takes ½ to ¼ second for each image and results in a delay of several seconds for the composite multi-image display. Such a time delay is at best disconcerting for a busy editor and precludes use of the editing features of the system during a real time broadcast.

U.S. Pat. No. 4,172,264, "Control Arrangement for Video Synchronizers", to Taylor et al describes an arrangement in which joysticks may be used to selectively position video images on a television display. The system requires full sized images to be accessed and then reduced in size as described above.

U.S. Pat. No. 4,302,776, "Digital Still Picture Storage System With Size Change Facility", to Taylor et al discloses a still store system in which multiple images may be accessed and reduced in size for simultaneous display as discussed above. The suggestion is made that an array of reduced size images be stored as a single image frame. This has the effect of eliminating the time required to reproduce the array but precludes the flexibility of choosing or repositioning any desired images when recalling the array. Furthermore, the aforementioned time delays are encountered when assembling the original multi-image display.

SUMMARY OF THE INVENTION

An electronic still store system in accordance with the invention rapidly generates and outputs for display to an operator a still image frame comprising a plurality of selectively positioned, reduce size images which may be simultaneously viewed for scanning or editing purposes. The system includes an image store for storing therein a plurality of frames of video images with both a full spatial resolution copy for full size video output and a reduced spatial resolution copy for reduced size video output of each image being stored. and a frame store which is operable in a first mode to receive from the image store, store and repetitively generate a full spatial resolution output image frame. The frame store is operable in a second mode to receive from the image store and store a plurality of reduced spatial resolution image frames. The frame store is further operable in the second mode to repetitively generate an output image frame having an image from each of the plurality of reduced spatial resolution image frames selectively located at a different position within the output image frame.

The system may further include an image size reducer coupled to produce a quarter size reduced spatial resolution image in response to a full resolution image stored by the frame store, a video input, an analog-to-digital converter coupling the video input to the frame store, a monitor for viewing output video images and an output digital-to-analog converter coupled to convert the output video images from a digital form to an analog form for use by the monitor. A central processing unit is connected to receive user commands through a user console and to control the other devices of the system in response thereto.

The image store employed herein is a general purpose magnetic disk storage system as is currently used in general purpose digital computer systems.

In operation the system can rapidly assemble an array of 16 reduced size images for output as a single image frame. A system operator may view the reduced size images simultaneously for rapid scanning of some or all of the stored images within the image store, which is preferably a magnetic disk. Because the images are read from the image store in reduced size and spatial resolution, the output image formation time is approximately the ½ to ¼ second required to transfer a single full size image instead of the several seconds which would be required to transfer 16 full size images prior to resolution reduction and storage as a reduced size image.

Using this system an operator may rapidly scan many still frame images which are stored by the image store or may compile lists of randomly selected image frames for simultaneous viewing as an array of reduced size images. Because of the rapid response rate the system becomes feasible for development and outputting of data frames containing multiple reduced size images on demand during a television broadcast.

BRIEF DESCRIPTION OF THE DRAWING

A better understanding of the invention may be had from a consideration of the following detailed description taken in conjunction with the accompanying drawing in which the sole FIGURE is a block diagram representation of an electronic still store system in accordance with the invention.

DETAILED DESCRIPTION

Referring now to the sole FIGURE, a digital electronic still store system 10 for rapidly assembling as a single image frame an array of reduced size images is shown as including a video input circuit 12. The video input circuit 12 may be another electronic still store system, a TV camera, or some other source of video data from which one or more frames of a video image

may be captured. In the preferred embodiment of the electronic still store system 10, the video signal is processed in component form. A method and apparatus for producing the component information which may be employed is more fully disclosed in the U.S. Pat. No. 4,675,876, issued Sept. 22, 1987 to D. Beaulier, which is assigned to the same assignee as this application, which is incorporated by reference herein. Therefore, the video input 12 will include appropriate video signal decoding means to process video data received from sources that provide the data in an encoded form.

An input analog-to-digital (A-D) converter 14 is coupled to receive an input video signal provided by the video input circuit 12, which typically includes video signal processing circuitry that prepares the signal for conversion by the A-D converter 14. The A-D converter 14 converts the input video signal to a digital form which is suitable for handling and processing by digital circuitry. The input AD 14 receives the video signal from the video input 12 and converts the video signal to the digital sampled data form in which each pixel of video data is represented by three eight bit data bytes defining respectively luminance, red chrominance and blue chrominance components. Conventionally, the chrominance data has half the spatial resolution of the luminance data in the horizontal dimension so that data is produced in a repetitive 4 byte luminance/chrominance component sequence of L1, CR1, CB1, L2—L3, CR3, CB3, L4 and so forth. The single byte representation affords a high dynamic resolution of 256 distinguishable states for each color component. For adequate dynamic resolution, each video component at a sampled data point is preferably defined by at least 6 binary bits providing 64 distinguishable intensities. A central processing unit (CPU) 16 formed from a Z80 microprocessor is connected to receive operator commands from a user console 18. CPU 16 is connected for bidirection communication of commands and other data over a system bus 20. The system bus 20 is connected to input A-D 14 as well as other major components of the still store system 10 to carry the address, mode select and status information required to control the operation of the still store system 10.

A frame store 22 which in the preferred embodiment is a random access memory, is coupled to receive mode control information from CPU 16 over system bus 20 and to receive video data representing a frame of a video image from either input A-D 14 or from a multiple frame image store implemented as a magnetic disk drive store 24 in the preferred embodiment but which can be any bulk storage memory device in other embodiments. Frame store 22 is a random access store that is capable of storing more data than is required for a single video image frame.

The storage capacity provided by presently available 64K memory chips enables storing up to 750 lines of video data. In any event, out of a 525 line NTSC frame of data only about 484 lines represent video data. Because of the two dimensional nature of a video image a quarter size image defined by video data having one-fourth the spatial resolution of a full size image requires one-sixteenth the storage capacity of a full size, full spatial resolution image. A quarter resolution image thus requires the equivalent storage of 30 lines of a full resolution image. In any event the frame store 22 either contains initially or is expanded to contain, storage of video data representing a full resolution full size image, as well as a quarter resolution copy thereof.

A size reducer 26 is connected to be controlled by data from CPU 16 received over the system bus 20. Size reducer 26 is operable to receive video data from frame store 22 to convert the video data to a quarter spatial resolution copy thereof, and communicate the quarter resolution copy back to frame store 22 for storage therein. In a similar fashion, when video data received from disk store 24 does not contain a corresponding quarter spatial resolution copy, size reducer 26 may be employed to generate a quarter spatial resolution copy for subsequent transfer to either frame store 22 or disk store 24. Hence, any time frame store 22 receives a video image frame that does not have a corresponding quarter resolution copy, the size reducer 26 may be used to make such a copy.

As a new frame of video data is transferred from frame store 22 to disk store 24 for more permanent storage, both the full resolution and the quarter resolution copy are transferred. Since the quarter resolution copy is represented by only one-sixteenth the data of a full resolution copy, the communication and storage of the quarter resolution copy imposes only a small burden on both system operating time and extra storage space requirement within disk store 24. It should be noted that disk store 24 is a general purpose magnetic disk storage device as is commonly used in connection with general purpose digital computing systems.

During system 10 operation frame store 22 repetitively accesses stored video data to generate a continuous stream of output video data frames representing the stored image. An output digital-to-analog converter 28 receives this digital output data and converts it to an analog video signal which is subsequently supplied to output processor 32. Output processor 32 is a conventional video signal output processor, for forming a television signal in a standard format, which can be used to drive a monitor 30 for viewing of the output video image by a system monitor. The analog video signal form may also be communicated to studio equipment for further use, broadcasting or storage.

When operating in a first, normal broadcast mode, frame store 22 receives a full resolution frame of video data from disk store 24 and outputs a continuous television image in digital data form in response thereto.

In a second, editing or browsing mode, CPU 16 commands disk store 24 to output reduced resolution image data which is selectively positioned in frame store 22 for viewing in one of 16 reduced size image positions in a 4×4 array as a mosaic which fits within a normal full size image. Under operator control, the 16 viewable images may be taken sequentially from disk store 24 starting with a selected image frame. This mode is useful when scanning all of the images stored by disk store 24. Alternatively, the 16 images may be taken randomly from a list of stored images developed by the operator. This mode is especially useful when it is desired to compare certain images.

The 16 image assembly time is greatly reduced because only an amount of data equivalent to one full size, full spatial resolution, image need be transferred from disk store 24 to define all 16 images. This is only one-sixteenth of the time that would conventionally be required.

While there has been shown and described above, a particular arrangement of an electronic still store system which can rapidly compose a multiple image frame of data, for the purpose of enabling a person skilled in the art to make and use the invention, it will be appreci-

ated that the invention is not limited thereto. Accordingly, any modifications, variations or equivalent arrangements within the scope of the attached claims should be considered to be within the scope of the invention.

What is claimed is:

1. An electronic still store system comprising:

an image store means for retrievably storing therein a plurality of image frame copies of video frames, the image frame copies comprising data representing full spatial resolution images and corresponding data representing reduced spatial resolution images of the video frames;

frame store means for receiving and storing in a first mode one of said full spatial resolution images from said image store means and for repetitively generating a full spatial resolution image output, and in a second mode for receiving from the image store means and storing a plurality of said reduced spatial resolution images each at selectively located different positions, the frame store means in the second mode further repetitively generating an image output comprising the stored plurality of said reduced spatial resolution images; and

size reducer means for receiving from the frame store means the stored full spatial resolution image and in response thereto returning to the frame store means a corresponding reduced spatial resolution image, wherein the frame store means receives and stores the returned reduced spatial resolution image while continuing to store the stored full spatial resolution image.

2. The electronic still store system according to claim 1, wherein the reduced spatial resolution images each have a spatial resolution of one-fourth the spatial resolution of the corresponding full spatial resolution image.

3. The electronic still store system according to claim 1, wherein said frame store means includes a central processing unit, controlled by an operator in said first mode for selecting which of said full spatial resolution images stored in said image store means is to be retrieved from the image store means, and in said second mode for selecting which of said reduced spatial resolution images stored in said image store means are to be retrieved and stored in said frame store means, and further for selecting the different positions within a video frame at which each of said retrieved reduced spatial resolution images is stored.

4. The electronic still store system according to claim 3, wherein said frame store means further comprises an output digital-to-analog converter coupled to receive output image data from the frame store means and in response thereto to generate an analog video signal representing an output image; and

a monitor coupled to receive the analog video signal and display the output image represented thereby.

5. The electronic still store system according to claim 4, further comprising a video input means for generating an input analog video signal representing an input video image and an analog-to-digital converter coupled between the video input means and the frame store means for converting the input analog video signal to a digital form such that digital data representing said input video image is received and stored by the frame store means.

6. A video still store system comprising:

external source means for supplying a full size image data set representing a full size image frame;

a size reducer coupled to receive the full size image data set for producing therefrom a reduced size image data set representing a corresponding reduced size image frame;

an image store for storing a plurality of full size image data sets representing a plurality of full size image frames and for storing a plurality of reduced size image data sets representing a plurality of reduced size image frames, each of said reduced size image data sets corresponding to one of said full size image data sets; and

frame store means for storing one of said full size image data sets from either the external source or said image store, wherein if said image store does not supply a corresponding reduced size image data set, said frame store outputs a copy of said full size image data set to said size reducer, and receives in turn a corresponding reduced size image data set;

wherein said image store stores the reduced size image data set along with the previously stored corresponding full size image data set.

7. An apparatus for storing video pixel data representing video images of a first resolution and, for each each of the images at said first resolution, a corresponding video image at a second resolution, comprising:

random access memory means for storing video pixel data representing one of a succession of full size images at said first resolution and a corresponding reduced size version thereof at said second resolution;

bulk memory means for receiving said video pixel data from said random access memory means and for storing said succession of full size images and the corresponding reduced size versions thereof, and for outputting upon a user's command, either a selected one of the successive full size images or selected ones of the corresponding reduced size versions thereof for direct transfer to, and storage back in, said random access memory means; and

means responsive to said random access memory means for selectively generating one of said corresponding reduced size versions from the respective full size image in said random access memory means, and for transferring the video pixel data representing and the corresponding reduced size version back to the contents of said random access memory means.

8. An apparatus for storing video pixel data as at least one full size image at a first resolution, and at least one reduced size image thereof at a second lower resolution, comprising:

random access memory means having an input port and an output port, for storing the video pixel data presented at the input port;

said video pixel data representing the full size video image at a first resolution being stored in a first group of memory locations in said random access memory means;

bulk storage memory for also storing the video pixel data and for presenting selected groups of video data at said input port for storage by said random access memory means;

size reducing means responsive to said random access memory means for directly receiving said video pixel data stored in said random access memory means representing said full size image at said first resolution, and for reducing said image to the re-

duced size image at the second lower resolution, and for supplying said reduced size image at said second resolution directly back to said random access memory means in a second group of memory locations therein;

control means coupled to said random access memory means, to said bulk storage memory and to said size reducing means, for causing said size reducing means to generate said reduced size image at said second resolution and to supply same to said random access memory means in said second group of memory locations; and

said control means further causing the transfer of the full size and reduced size video pixel data from said random access memory means to said bulk storage memory for storage, and for causing the selective transfer from said bulk storage memory directly into said random access memory means of either said full size image at said first resolution or said reduced size image at said second lower resolution.

9. The apparatus of claim 8 wherein said size reducing means produces said reduced size image at said second resolution with one fourth the spatial resolution of said full size image at said first resolution, and wherein said control means determines the transfer of said reduced size image at said second resolution into said random access memory means for storage at a selected one of 16 predetermined groups of said memory locations.

10. A system for storing video data representing video images which are displayable as rasters of vertically distributed horizontal lines, each represented video image normally occupying a raster of selected vertical and horizontal size, the system comprising:

a video image size reducer having an input for receiving video data representing a video image corresponding to the selected raster size and for generating video data representing a reproduction of said video image at a selected fractional-size of said selected raster size;

a first store for receiving video data for storage and for providing video data therefrom, said first store having a capacity for storing the video data representing the video image corresponding to the selected raster size simultaneously together with the video data supplied by said video image size reducer representing said reproduction of the video image at the selected fractional-size;

a second store for receiving and storing the video data stored in the first store and for providing video data therefrom directly to the first store, said second store further storing video data representing a plurality of additional video images each corresponding to the selected raster size, and video data representing a plurality of additional reproductions at the selected fractional size of said selected raster size; and

means for selectively transferring from said second store directly to said first store either video data representing of the plurality of video images corresponding to the selected raster size, or video data representing a plurality of reproductions at the selected fractional-size of said selected raster size.

11. A method of storing video pixel data comprising:

receiving and storing in selected storage locations in a random access memory, full video pixel data comprising a full size image;

generating from the full video pixel data, reduced video pixel data representing a reproduction thereof in the form of a reduced size image at a lower resolution;

storing the reduced video pixel data representing the reduced size image in additional storage locations in said random access memory along with the full video pixel data;

storing both the full size image and the reduced size image in bulk storage memory; and

selectively transferring either the full size image or the reduced size image from said bulk storage memory into said random access memory for further processing.

12. A video still store system comprising:

an external source for supplying a plurality of full size image data sets representative of corresponding full size images;

an image store for storing said full size image data sets, and for storing a like plurality of reduced size image data sets representing a plurality of reduced size images, each of said reduced size image data sets corresponding to one of the full size image data sets;

a memory for simultaneous storage of one of said full size image data sets and a corresponding one of said reduced size image data sets;

a size reducer means for receiving from said memory the stored one of said full size image data sets, and for producing and returning to said memory the corresponding one of said reduced size image data sets;

said memory being responsive to either the external source or the image store for storing said one of said full size image data sets, and for supplying to the image store both the stored one of said full size image data sets and the corresponding one of said reduced size image data sets;

said memory being responsive to the image store to store at different selected locations the plurality of reduced size image data sets;

said memory further supplying as an output image either the plurality of reduced size image data sets arranged at different locations within the output image, or the full size image data set; and

means responsive to said memory for displaying the output image as a raster scanned video display.

13. A method of storing video pixel data for access and display comprising:

providing data sets for a plurality of full size images at a first spatial resolution;

generating, from the data sets of the full size images, second data sets representing a corresponding plurality of reduced size reproduction images at a second lower spatial resolution;

storing both the data sets of the plurality of full size images and the data sets of the corresponding plurality of reduced size reproduction images in respective selected groups of storage location; and

selectively accessing from the storage locations a data, set representing one of the plurality of full size images, and a data set representing one of the corresponding plurality of the reduced size reproduction images, simultaneously.

14. An apparatus for storing video pixel data as at least one full size image at a first resolution, and at least one reduced size image thereof at a second lower resolution, comprising:

random access memory means having an input port and an output port, for storing the video pixel data presented at the input port;

said video pixel data representing the full size video image at a first resolution being stored in a first group of memory locations in said random access memory means;

bulk storage memory for also storing the video pixel data and for presenting selected groups of video data at said input port for storage by said random access memory means;

size reducing means responsive to said random access memory means for receiving said video pixel data stored in said random access memory means representing said full size image at said first resolution, and for producing reduced size pixel data representing the reduced size image at the second lower resolution, and for supplying said reduced size image at said second resolution to said random access memory means in a second group of memory locations therein;

control means coupled to said random access memory means, to said bulk storage memory and to said size reducing means, for causing said size reducing means to generate said reduced size image at said second resolution and to supply said reduced image to said random access memory means in said second group of memory locations;

said control means further causing the transfer of the full size and reduced size video pixel data from said random access memory means to said bulk storage memory for storage, and for causing the selective transfer from said bulk storage memory into said random access memory means of either said full size image at said first resolution or said reduced size image at said second lower resolution; and

wherein said control means also determines the selective transfer of said reduced size image at said second resolution from said size reducing means into said bulk storage memory via the random access memory means.

15. A method of storing video pixel data for access and display comprising:

providing data sets for a plurality of full size image at a first spatial resolution, wherein each one of the full size images occupies upon display a raster of selected vertical and horizontal size;

generating, from the data sets of the full size images, second data sets representing a corresponding plurality of reduced size reproduction images at a second lower spatial resolution;

storing both the data sets of the plurality of full size images and the data sets of the corresponding plurality of reduced size reproduction images in respective selected groups of storage locations;

selectively accessing from the storage locations a data set of one of the plurality of full size images, and one of the sets of the corresponding plurality of the reduced size reproduction images simultaneously;

wherein the step of accessing further includes, retrieving a plurality of reproduction images, storing the retrieved plurality of images in a random access memory, and outputting the stored plurality of retrieved images as a mosaic of reproduction images occupying a raster of the selected vertical and horizontal size.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,821,121
DATED : April 11, 1989
INVENTOR(S) : Daniel A. Beaulier

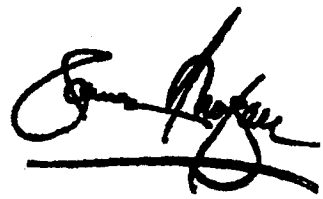
It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 6,
Line 46, please delete "and"

Column 8,
Line 61, please delete ","

Signed and Sealed this

Fourth Day of March, 2003



JAMES E. ROGAN
Director of the United States Patent and Trademark Office


U.S. PATENT & TRADEMARK OFFICE

EXHIBIT 2

Redacted

EXHIBIT 3

A

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
06/483,327	04/08/83	BEAULIER D	AV-3033

PATENT DEPT.
AMPEX CORP.
401 BROADWAY, M.S. 3-35
REDWOOD CITY, CA 94063

EXAMINER	
HARVEY, D	
ART UNIT	PAPER NUMBER
262	3

DATE MAILED: 12/21/84

This is a communication from the examiner in charge of your application.

COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 (three) month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☒ Notice of References Cited by Examiner, PTO-892.
2. ☐ Notice re Patent Drawing, PTO-948.
3. ☐ Notice of Art Cited by Applicant, PTO-1449
4. ☐ Notice of Informal Patent Application, Form PTO-152
5. ☐ Information on How to Effect Drawing Changes, PTO-1474
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☒ Claims 1 - 14 are pending in the application.
   Of the above, claims _____ are withdrawn from consideration.
2. ☐ Claims _____ have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☒ Claims 1 - 14 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings which are acceptable for examination purposes until such time as allowable subject matter is indicated.
8. ☐ Allowable subject matter having been indicated, formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. These drawings are ☐ acceptable; ☐ not acceptable (see explanation).
10. ☐ The ☐ proposed drawing correction and/or the ☐ proposed additional or substitute sheet(s) of drawings, filed on _____ has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved. ☐ disapproved (see explanation). However, the Patent and Trademark Office no longer makes drawing changes. It is now applicant's responsibility to ensure that the drawings are corrected. Corrections MUST be effected in accordance with the instructions set forth on the attached letter "INFORMATION ON HOW TO EFFECT DRAWING CHANGES", PTO-1474.
12. ☐ Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

PTOL-326 (Rev. 7-82) EXAMINER'S ACTION

1. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

The claimed invention deals with the storage, retrieval, and size reduction of still video images. The apparent novelty of the claimed system is that a "stored video frame", corresponding to a given video image, includes a full resolution and a quarter resolution copy of the said video image. This definition of "frame" seems to be made on page 7, lines 7-10, of the disclosure where it is stated, "as a new frame of video data is transferred from the frame store 22 to the disk store 24 for more permanent storage, both the full resolution and quarter resolution copy are transferred." Thus "frame" is interpreted, as described in the disclosure, to define a frame of data which incudes both a full and a quarter resolution copy of a given image.

The use of "frames" in claim 1, lines 3-5, is indefinite. It is not clear whether "frames of video images" refers to either full resolution frames or quarter resolution frames or to frames which contain both a full and a quarter resolution copy.

In claim 1, lines 8-15, and in claims 2, 3, 6 and 7 the use of the term "frame" is also indefinite. It becomes very confusing when "frame" seems to describe two different techniques of data storage. In the first case, "frame" seems to refer to data which contains both resolution copies and in the next case it seems to refer to separate full and reduced resolution "frames".

In claim 1, line 7, the use of "receive" is indefinite. The claim does not clearly state what is being received.

In claim 4, lines 4-5, the use of "frame store" seems to be incorrect. The claim implies that image copies are retrieved from the frame store and then stored back in the same frame store at a different location.

In claim 4, line 6, and in claim 5, lines 5-7, the use of the terms "image copy" and "image" is indefinite when referred back to the problems as stated for claim 1. The distinction among "frames", "images" and "image copies" has not been clearly defined.

The applicant is also asked to make sure that all of the terms used in the claims have antecedent basis, where needed, when correcting the problems as stated above.

2. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 and 3-14 are rejected under 35 U.S.C. 103 as being unpatentable over the publication by Hugh, Boyd, Quantel.

The apparent novelty of the claimed invention as disclosed seem to be as follows:

1) each stored "frame" of video data contains both a full and a quarter resolution copy of the image;

2) size reduction and production of the "frame" of video data is performed by the interaction between the size reducer and the frame store prior to storage in the image storage;

3) and the "frame" of video, containing both resolution copies, is non-selectively produced for all images that are stored.

The above claims do not clearly describe the apparent novelties of the claimed invention. Thus the claims are broad enough to read upon the "Quantel DLS6000" as described by Hugh Boyd. This system stores a plurality of still frames on disk memory (image memory). These "full resolution" frames can be copied out of memory, reduced in size, and placed in any desired position of a "frame store." (Pg. 47; column 1; lines 11-19). These reduced resolution images can then be stored back on disk memory (Pg. 47, column 3; lines 18-25). Thus the disc store can contain a plurality of frames with full and reduced resolution copies. The "frame store" can also hold either copy and can position the reduced copies in the store as desired for output.

4. Any inquiry concerning the merits of this office action or earlier communications from the exa-

miner should be directed to David E. Harvey whose telephone number is (703) 557-6844. Any inquiry of a general nature of relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 557-3321.

DE Harvey:klw DH
12-17-84
(703) 557-6844

JOHN C. MARTIN
SUPERVISORY PATENT EXAMINER
GROUP 260

TO SEPARATE, HOLD TOP AND BOTTOM EDGES, SNAP-APART AND DISCARD CARBON

FORM PTO-892 (REV. 3-78) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	SERIAL NO.	GROUP ART UNIT	ATTACHMENT TO PAPER NUMBER
NOTICE OF REFERENCES CITED	06/483327	262	3
	APPLICANT(S) Beaulier		

U.S. PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	NAME	CLASS	SUB-CLASS	FILING DATE IF APPROPRIATE
	A	4,152,722	5/1/79	Inuiya et al.	358	102	
	B	4,302,776	11/24/81	Taylor et al.	358	160	
	C						
	D						
	E						
	F						
	G						
	H						
	I						
	J						
	K						

FOREIGN PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUB-CLASS	PERTINENT SHTS. DWG	PERTINENT PP. SPEC.
	L								
	M								
	N								
	O								
	P								
	Q								

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)

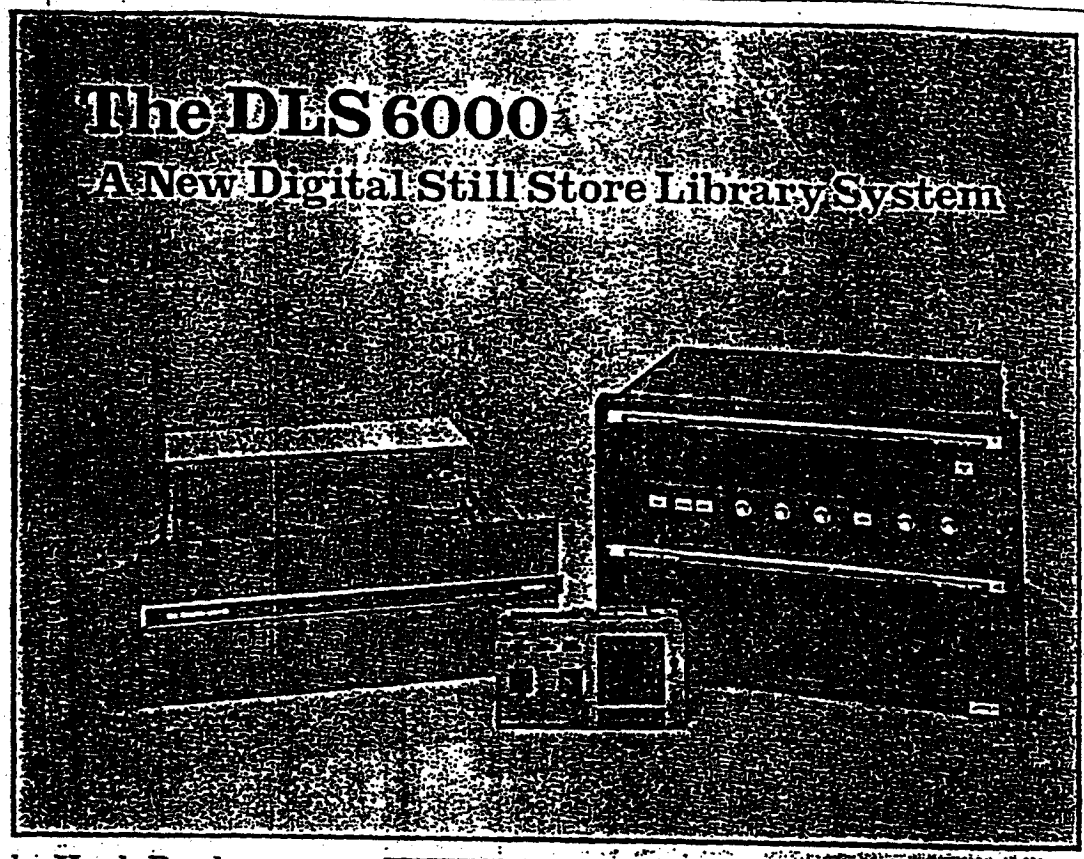
R	Hugh Boyd, "The DL-6000 - A New Digital Still Store Library System" International Broadcast Engineer, Vol. 11, No 170, PP. 46-48 3/80 (360/35,1)
S	
T	
U	

EXAMINER	DATE
David E Harvey	12/4/84

* A copy of this reference is not being furnished with this office action.
(See Manual of Patent Examining Procedure, section 707.05 (a).)

360 - 5.1 S0466 0079

The DLS 6000
A New Digital Still Store Library System



by Hugh Boyd,
Quantel.

The Quantel DLS 6000 Digital Library System was first introduced to broadcasters at private demonstrations held during last year's NAB and Montreux exhibitions. At that time, the product was still under development, and Quantel were seeking comments from their invited guests as to the final configuration of the DLS 6000. The proferred advice was considered sufficiently valuable by Quantel engineers for some of it to be included in the ultimate system design, which will be demonstrated publicly for the first time at NAB 1980.

The DLS 6000 represents a new generation of still stores for television broadcasting. The system provides not only significant improvements in basic performance over existing techniques, it also offers several unique facilities that make the unit a complete production tool. At only 10.5 inches high for the DLS 6000, and 7 inches high for the storage disc unit, the system is ideally suited for OB van use as well as in the studio.

The Digital Library System is a naturally evolutionary product to come from the Quantel stable. It is revolutionary in concept and is based on a solidly engineered, flexible piece of hardware utilising three framestores and a DEC LSI-11 minicomputer. Typically, the DLS 6000 embodies

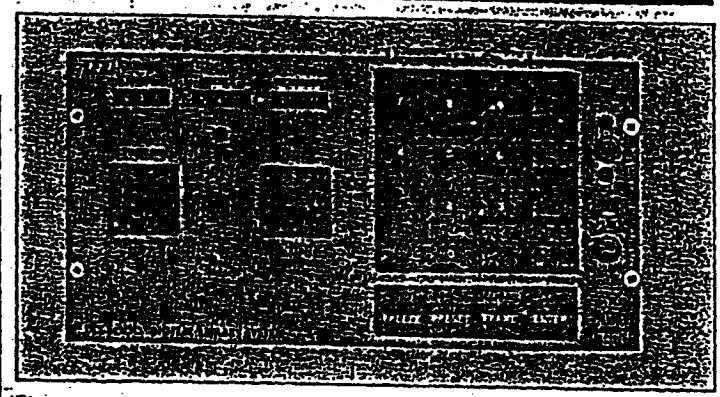


Figure 1. The DLS 6000 Control Panel

Quantel's basic principle of expandability by retrofitting new options as they become available. The word "obsolete" does not exist in the Quantel vocabulary!

Infinite Storage Capacity

The disc unit has a picture capacity of up to 340 stills. With multiple disc operation, say ten discs, 3400 pictures would be randomly accessible. However, the number of discs allowed is wisely unlimited, but is is anticipated that broadcasters requiring very large library storage will avail themselves of a video tape back-up store — a unique feature of the DLS 6000. Because the data is transferred in digital form, there is no loss of quality. Picture information can be transferred automatically from disc to a standard video cassette or reel-to-reel machine without it being modified, whether it is in use in a studio or OB van.

Transfers from tape to disc work in exactly the same way, therefore a cassette is all that is required to move information between locations. Similarly, a full archival store library can be formed from cassette or tape with more than 3000 pictures being stored on one tape. Again, being digital in format, no generation losses are seen no matter how many times the information is recorded or re-recorded.

WSC 3-58 - 128 XR 360 - 35

Production Effects Capability

The provision of a number of production effects seems to be a logical facility for a Quantel framestore-based product. The DLS 6000 has this integral feature for very practical reasons.

Picture repositioning is achieved by the simple movement of a joystick on the compact 8" x 4" control panel (Figure 1).

Picture compression is also achieved by moving a joystick. The stored image may be reduced to any size between normal (full frame) and virtually zero size. This feature, when used with repositioning, defines the exact size and position of a still without employing any other digital effects system.

Picture enlargement. Joystick movement enlarges the image up to two times to allow selection of a chosen portion of a still.

Variable aspect ratio. The aspect ratio of the image can be varied from the normal 4 x 3 to any rectangular shape.

Multiple picture handling. The DLS 6000 is capable of reproducing as many pictures as are wanted at the same time. This facility is clearly an adjunct to compression and repositioning. It is used either to show, at the same time, a number of participants in a discussion or event, or even to build up a complete montage of images. The pictures can be called down from the disc one at a time to show the viewer the build up, or can be called simultaneously so that only the finished composite is broadcast.

Borders. The DLS 6000 is equipped with its own border generator capable of changes in hue, saturation, luminance and width. Borders can be placed around all pictures being shown if desired, although different images can have quite different border parameters at the same time. The border generator also includes a background or matte generator, further releasing the mixer for other functions.

Extensive Operating Features

Both the technical director and the system operator were kept very much in mind by Quantel when designing the Digital Library System. Each has a computer display panel, with the director's being associated with the mixer and almost always used for replay. Whereas, the panel the operator (or "composer") uses, will be essentially employed for recording. The DLS 6000 is capable of single or two person operation, so two control panels may access the machine simultaneously for *time sharing*.

High change rate. Pictures can be changed at a rate of two per second with complete random access. Thus, no cache memory of the day's programme requirement has to be prepared.

On-air picture change. Although the change rate is limited to two per second, the additional framestore circuitry in the DLS 6000 allows vertical interval switching between pictures. The switch is instantaneous: only the throughput rate is limited to two per second.

On-air transitions. When using the DLS 6000, a mix/effect bus can be eliminated by utilising the digital transitions available in the unit. Changes between one picture and the next can be by means of a simple cut, a programmable dissolve, or even a wipe.

Multiple outputs. Three outputs are available with the DLS 6000 — two programme and one preview. Internally generated transitions are possible with both programme outputs, or they can be used together to utilise more exotic wipes in a mixer. Keys are generated by the system to match the picture at all times.

Preview. The DLS 6000 has its own preview output which can be operated without affecting the on-air programme or transitions. The preview allows the varying sizes or positions of images to be chosen by means of cross wires controlled by joysticks, and also contains the fast viewing or "browse" feature.

Browse. The preview facility has the ability to look through the contents of the disc by displaying 25 images at a time, and slowly moving them down the screen. This rolling list of pictures allows easy viewing to find a desired frame, or alternatively, permits the showing of pre-chosen slides waiting in the "stack" for display during a programme.

On-air editing. As previously mentioned, the on-air display or transition is unaffected by previewing. Similarly, the DLS 6000 permits the capture and recording of incoming material while the equipment is being used during a broadcast. This is an essential feature to get the full benefit of the system in a news studio situation.

Asynchronous operation. The input of the Digital Library System can handle asynchronous information to allow stills to be captured from incoming ENG material.

Graphics handling. The DLS 6000 is capable of keying stored graphics over displayed images, thereby releasing the mixer from this function. Graphics may have their size and position defined quite independently of picture information, always assuring perfect readability for all sizes of titled images.

Digital re-recording of composite pictures. Composite pictures created on the preview monitor can either be stored as control parameters to ensure recall on demand on the programme outputs, or alternatively, can be re-recorded back onto disc as a complete new picture at an individual location.

Editing system. Complete sequences of commands to the DLS 6000 can be set up and stored for simple single button operation during a programme. The editing system does, however, allow simple addition or deletion of items to ensure ease of operation in a fast moving news broadcast. The minicomputer in the system will permit the addition of standard computer peripherals at a later date to accommodate even more powerful editing equipment.

Control delegation. As previously stated, the control of the DLS 6000 can be time-shared between several stations including during a live broadcast. Separate preparation and replay panels permit the technical director to remain divorced from the recording of stills from incoming ENG material.

Obviously, the basic task of the Digital Library System is to replay the correct picture from the disc store. However, the usefulness of the system is greatly enhanced by the ability to choose the size and position of the replayed picture, and to define it in accordance with the requirements of the rest of a production. The Quantel tradition of high fidelity is maintained in the quality of the images produced by the DLS 6000 at all times, whether the size of the still has been modified or not. At all sizes and shapes, the unit displays excellent image quality, with-

GROUP 123

SLIDE	PICTURE	SIZE & POSITION	BORDER	TRANSITION	CUE
0	23	NORMAL	ON	DISSOLVE	20
1	18	COMPRESS	OFF	CUT	
2	14	ENLARGE		WIPE	10
3					
4	36	COMPRESS		SUPER	INSTANT
5	100	COMPRESS		SUPER	
6	23	COMPRESS		CUT	
7					
8	11	NORMAL		CUT	EXT
9	10				

NEXT GROUP 130

Figure 2. An example of a typical Edit Display (as would appear on the TV monitor).

out showing any hint that the video has been processed.

The Control System

The philosophy behind the control system for the Digital Library System is based on the concept of Pictures, Slides and Groups. A Picture is defined as an image on disc and has a number allocated to it at the time of recording. Pictures are normally recorded on disc at full size to give maximum flexibility on replay. A Slide is a Picture on replay that has the parameters of size, position, transition type and time, etc, allocated to it. The number of a Slide need not be the same as the number of the Picture that the Slide depicts. A Group is a collection of up to ten Slides.

It is essential to appreciate that, with this machine, defining a still merely by a number is insufficient due to the extra facilities available. Therefore, both the still and what is to be done with it must be defined before displaying on the programme output. The computer display. The extra degree of freedom made available by the DLS 6000 production features, make it necessary that at both preparation time and programme time, the operator always has a clear picture of exact machine status. In order to give the user this clear indication of the situation, a video display system has been added to the host computer, and it is via this display system that all setting of parameters is achieved.

The computer display output is added to the preview output, and hence, shares the preview screen. There are three types of computer display available to the user: Edit, Ident and Menu. A cursor display is added to all these to allow the size and shape of images to be defined on the preview monitor.

A Typical example of the Edit display is shown in Figure 2. It will be seen that the Slide number is independent of the Picture number as has been described earlier.

The Ident display overlays the true Picture number when using the "browse" feature, so that the various chosen Pictures may be easily identified.

The Menu display is a special option that allows selection of modes of use of the machine, and it is this display that is used in conjunction with the tape backing store system.

The recording chain is shown at the top of Figure 3. Input video enters the system and is immediately converted into digital format and passed to a framestore at full video data-rate. This input framestore acts as a freeze frame device and allows the user to select still pictures from the incoming live video. For simplicity, the link from the output of this store to the preview output from the DLS 6000 has not been shown, but in reality, the video follows this path allowing the user to observe the incoming picture at all times, whether live or frozen.

Once the chosen image has been frozen in the framestore it is read out from the store at disc rate via a data processor section to further reduce data rates, and then via the disc formatter to block the information suitable for writing onto the disc.

The disc itself is a latest generation Winchester drive high packing density sealed unit. The heads are of the flying type, but the construction of the disc eliminates the need to have expensive and unreliable head retraction mechanism — the heads actually land on the disc surface when the platter is not in motion. The disc data rate allows a picture to be generated in 0.5 seconds. The total package is highly reliable and rugged and includes parity check circuitry for optimum data integrity.

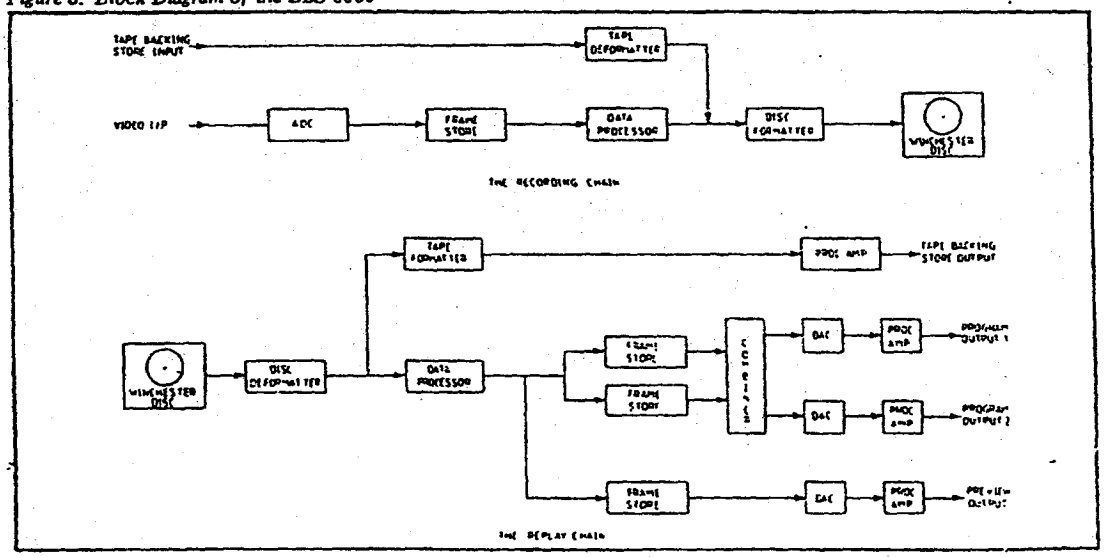
The replay chain, shown at the bottom of Figure 3, is obviously more complex than record due to the increased number of framestores and programme output facilitites. Data from the disc passes through a disc re-formatter where the information is sorted out from its blocks, and then onto the data processor where it is unpacked. At this point, the information is passed to one of the three framestores available, and it is now that the size change mechanism operates. If the information is routed via the preview store, no other processing is done other than reading it out of the store at full video rate into a DAC and onto the display via a proc amp. If the data is fed to one of the programme stores, it is subsequently passed to a digital combiner assembly that performs the appropriate wipe, cut or dissolve functions. Also, the combiner copes with the addition of borders or the keying of caption information over pictures or coloured matte.

For convenience, one framestore is shared between the video input facility and the preview output. Not shown in Figure 3 is the host DEC LSI-11 minicomputer that controls the whole machine and is responsible for all housekeeping tasks, the operation of the control panel and the editing system.

The tape backing store system is interfaced to the disc before and after the disc formatter and de-formatter. The information on disc has to be prepared and re-blocked by the tape formatter prior to the addition of syncs and burst for feeding to the tape system. It should be remembered that the tape system is perfectly conventional, and can be any recorder available in the studio or OB van.

When receiving information from the tape backing store, information is unpacked and blocked in a tape de-formatter before being passed on to the disc. The DLC 6000 Digital Library System is available in NTSC standard. But, as usual with Quantel, it is reasonable to assume that PAL and SECAM versions are already being developed. When they are introduced, one can expect even more flexible facilities to be unveiled, and naturally, none of them will make any other part of the existing system obsolete. ■

Figure 3. Block Diagram of the DLS 6000



B

13/6 Lucas PATENT 2/11/86

THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
DANIEL A. BEAULIER
Serial No. 740,297
Filed: May 31, 1985
Title: ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION

Art Unit: 262
Examiner: D. Harvey
Attorney Docket No. AV-3033 N1

B5/1 2.19.86

Honorable Commissioner
of Patents and Trademarks
Washington, DC 20231

Sir:

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, or 1-28-86

Bradley A. Perkins, Reg. # 31,406 DATE 1-28-86

AMENDMENT

In response to the first Office Action dated September 3, 1985, please amend the above-identified application as follows:

2-21-86 gs

IN THE CLAIMS:

Please cancel Claim 1.

Please amend Claim 2 as follows:

2. (Once Amended) An electronic still store system comprising:

an image store for retrievable storing therein a plurality of image frame copies of frames of video images, the image frame copies comprising [with both] a full spatial resolution image frame copy and a reduced spatial resolution image frame copy of each frame of video images [image frame being stored];

a frame store which is operable in a first mode to receive and store one of said full spatial resolution image frame copies [frames of video images] from the image store and repetitively generate a full spatial resolution output image frame and operable in a second mode to receive from the image store and store a plurality of said reduced spatial

resolution image frame copies [frames], the frame store being further operable in the second mode to repetitively generate [an] a reduced spatial resolution output image frame having an image frame comprising a [from each of the] plurality of said reduced spatial resolution image frame copies [frames] selectively located at [a] different [position] positions within the output image frame; and

a size reducer coupled to receive from the frame store a full spatial resolution image frame copy and in response thereto to return to the frame store a reduced spatial resolution image frame copy and wherein the frame store is operable to receive and store the reduced spacial resolution image frame copy while continuing to store the full spatial resolution image frame copy.

Please amend Claim 3 as follows:

3. (Once Amended) The electronic still store system according to claim 2 above, wherein the reduced spatial resolution image frame copies [frames] each have a spatial resolution of one-forth the spatial resolution of the full spatial resolution image frame copies [frames] in each dimension [of an image].

Please amend Claim 4 as follows:

4. (Once Amended) The electronic still store system according to claim [1] 2 above, further comprising a central processing unit, controlled by an operator, coupled to select [in response to control by an operator] which of said image frame copies are retrieved from the image store and the location within the frame store at which each of said image frame copies [copy] is stored.

Please amend Claim 5 as follows:

5. (Once Amended) The electronic still store system according to claim [1] 2 above, further comprising a central processing unit, controlled by an operator, which is coupled [to select in response to control by an operator] to command the retrieval of a plurality of reduced spatial resolution image frame copies [frames] from the image store and to select the placement of the retrieved image frame copies [frames as reduced size image frames] within [an] said reduced spatial resolution output image frame generated by the frame store.

Please amend Claim 6 as follows:

6. (Once Amended) The electronic still store system according to claim 5 above, further comprising an output digital-to-analog convertor coupled to receive said output image frames from the the frame store and in response thereto to generate an analog video signal representing the received output image frames; and a monitor coupled to receive the analog video signal and display the output image frames represented thereby.

Please amend Claim 7 as follows:

7. (Once Amended) The electronic still store system according to claim 6 above, further comprising a video input generating an analog video signal representing a sequence of input video image frames and an analog-to-digital converter coupled between the video input and the frames store and converting the analog video signal to a digital form in which digital data representing [a] said input video image frame can be received and stored by the frame store.

Please amend Claim 8 as follows:

8. (Once Amended) The electronic still store system according to claim 7 above, further comprising a user console coupled to receive operator commands and output [received] operator command signals [commands] to a central processing unit, the central processing unit coupled to receive the operator command signals [commands] output by the operator console and in response thereto to generate control signals for controlling system devices including the input analog-to-digital converter, the image store, the frame store, the size reducer, and the output digital-to-analog converter, and a system bus [coupling] supplying the control signals to the controlled system devices.

Please amend Claim 9 as follows:

9. (Once Amended) A video still store system comprising:

a size reducer coupled to receive, from a frame store capable of simultaneously storing both a full size and a reduced size image data sets, a full size image data set representing a full size image frame and produce and return to said frame store a reduced size image data set representing a corresponding reduced size image frame in response thereto;

an image store for storing a plurality of said full size image data sets representing a plurality [of frames] of full size images frames and for storing a plurality of reduced size image data sets representing a plurality of reduced size image frames [images], each of said reduced size image data sets corresponding to one of the full size image data sets [images, said reduced size images occupying less space within said image store than said full size images]; and

[a] said frame store coupled to selectively receive from either an external source or the image store and store one of said [a frame of] full size image data sets representing a full size image frame to selectively [repetitively] retrieve and output a stored [frame of the] full size image data set, to retrieve and communicate to the size reducer the stored [frame of] full size image data set, to receive from the size reducer and store said [a frame of] reduced size image data set representing a reduced size image frame corresponding to the stored full size image data set, to selectively retrieve and output to the image store both the [frame of] full size image data set and the [frame of] reduced size image data set, and to receive from the image store and store a plurality [of frames] of reduced size image data sets with the reduced size image data sets for each different reduced size image frames being stored in a different location within the frame store such that when the frame store operates to [repetitively retrieve and] output a stored frame of full size image data set for use by a device generating a television signal, the reduced size [images] image frames represented by the reduced size image data sets are disposed at different selected locations within an output image frame represented by a [repetitively retrieved and output frame of] full size image data set.

Please amend Claim 10 as follows:

10. (Once Amended) An electronic still store system comprising:

a size reduce which receives normal size image data, from a frame store capable of simultaneously storing both full size and reduced size image data, representing a normal size video image and converts the normal size image data to reduced size image data representing a reduced size video data image and returns said reduced size image data to said frame store;

[a] said frame store coupled to receive and store at first selected locations therein normal size image data [representing a video image], the frame store being coupled to communicate full size image data to the size reducer, to receive back from the size reducer reduced size image data, to store the reduced size image data received from the size reducer in second selected locations in the frame store, and to repetitively output the full size image data, the frame store being further operable to receive and store in the first selected locations [image data representing] a plurality of reduced size image data images to form a single normal size video image comprised of the plurality of reduced size video images; and

an image store coupled to receive from the frame store, store and retrieve, said normal image data and said reduced size image data [image data representing a plurality of normal size images and image data representing a reduced size image of each of the normal size images, said reduced size images occupying less space within said image store than said full size images].

Please amend Claim 11 as follows:

11. (Once Amended) A video still store system comprising:

a size reducer coupled to receive, from a frame store capable of simultaneously storing both a full size and a reduced size image data set, a full resolution image data set representing [a frame of] a full resolution image frame and produce and return to said frame store a reduced resolution image data set representing [a frame of] a corresponding reduced resolution image frame in response thereto;

an image store for storing a plurality of said full resolution image data sets representing a plurality [of frames] of full resolution image frames [images] and a plurality of reduced resolution image data sets representing a plurality of reduced resolution image frames [images], each reduced resolution data set corresponding to one of the full resolution image data sets [images]; and

[a] said frame store operably coupled to selectively receive from either an external source or the image store and store a [frame of] full resolution image data set representing a full resolution image frame, to repetitively retrieve and output a stored [frame of the] full resolution image data set, to retrieve and communicate to the size reducer the stored [frame of] full resolution image data set, to receive from the size reducer and store a [frame of] reduced resolution image data set representing a reduced resolution image frame corresponding to the stored full resolution image frame, to selectively retrieve and output to the image store both the [frame of] full resolution image data set and the [frame of] reduced resolution image data set, and to receive from the image store and store a plurality of [frames of] reduced resolution image data sets [with the reduced resolution image data], without cutting or further reducing said reduced resolution image data set, for each different reduced resolution image data set being stored in a different location within the frame store [which] such that when the frame store operates to repetitively retrieve and output a stored frame of full resolution image data set, the reduced resolution image frames [images] represented by the reduced resolution image data sets are disposed at different selected locations within an output image represented by the repetitively retrieved and outputted [output frame of] full resolution image data set.

Please amend Claim 12 as follows:

12. (Once Amended) The method of operating a video still store system having an image store and a frame store coupled for bidirectional communication of video data with the image store comprising the steps of:

writing into the image store video data representing a plurality of full resolution image frames [images];

reducing said video data representing a plurality of full resolution image frames;

writing into the image store for each said full resolution image frame said video data representing a reduced resolution image frame copy thereof, in response to said writing into the image store video data representing a plurality of full resolution image frames [said reduced resolution copy of each said full resolution image occupying less space within said image store than said full resolution image]; and

transferring from the image store to the frame store for assembly in the frame store as a single composite image said video data representing a reduced resolution image frame copy of each of a selected plurality of reduced resolution image frame copies [images].

Please amend Claim 13 as follows:

13. (Once Amended) The method of operating a video still store system according to claim 12 above, wherein each reduced resolution image frame copy has a spatial resolution of one-forth the spatial resolution of the corresponding full resolution image frame in each of two display dimensions.

Please amend Claim 14 as follows:

14. (Once Amended) The method of operating a video still store system having an image store and a frame store coupled to receive video data from the image store comprising the steps of:

writing into the image store video data representing a plurality of full resolution image frames [images];

reducing said video data representing a plurality of full resolution image frames;

writing into the image store for each said full resolution image said frames video data representing a reduced resolution image frame copy thereof, in response to said writing into the image store video data representing a plurality of full resolution image frames [said reduced resolution copy of each said full resolution image occupying less space within said image store than said full resolution image];

transferring from the image store to the frame store video data representing a reduced resolution image frame copy of each of a selected plurality of reduced resolution image frames [images]; and

storing the transferred video data in the frame store in locations selected to produce a composite output image frame having each of the reduced resolution image frames [images] represented by the transferred video data positioned at a selected different position within the composite output image frame.

Please add Claim 15 as follows:

15. A video still store system comprising:

a size reducer coupled to receive a full size image data set representing a full size image frame and produce reduced size image data set representing a corresponding reduced size image frame in response thereto;

an image store for storing a plurality of said full size image data sets representing a plurality of full size image frames and for storing a plurality of reduced size image data sets representing a plurality of reduced size image frames, each of said reduced size image data sets corresponding to one of said full size image data sets; and

a frame store coupled to selectively receive from either an external source or said image store and store one of said full size image data sets, said frame store is operable such that when a full size image data set is received from an external source or is received from said image store and said image store does not contain a corresponding reduced size image data set, said frame store outputs a copy of said full size image data set to said size reducer and in response thereto receives a corresponding reduced size image data set which is outputted to said image store for storage with the corresponding full size image data set.

REMARKS

The first Office Action of September 3, 1985 has been carefully considered. Reconsideration of the application, as amended, is respectfully requested.

Claims 1 through 14 are pending in this application. Claims 1 through 14 have been amended and Claim 15 has been added.

Claims 1 through 14 were rejected under 35 U.S.C. 112, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention.

Claim 1 has been cancelled.

The Examiner notes a number of problems with Claim 2 in regards to the use of image frames. Applicant has made a number of changes to Claim 2 to correct the problems along the lines suggested by the Examiner. Other changes have been made to Claim 2 for the sake of internal consistency. Claim 2 has been amended to make clear that "a full spatial resolution image frame" refers to "image frame copy".

Claim 3 has been amended to conform to the changes in Claim 2. Claim 3 has further been amended by removing "of an image" that is considered indefinite by the Examiner.

In Claim 4, the Examiner objects to "in response to control by an operator". Claim 4 has been amended to make clear that the central processing unit is "controlled by an operator". The Examiner notes that "image frame copies", in Claim 4, should be proceeded by "said". This has been done.

Claim 5 has been amended to conform with amended Claim 1 as requested by the Examiner. The control by an operator has been corrected as was done in Claim 4. The "output image frame" now, also, has the proper antecedent basis.

Claim 6 has been amended to conform to Claim 5 as requested by the Examiner. The phrase "image frames" is now "output image frames", thus supplying the antecedent basis required.

The Examiner finds the phrase "sequence of video image frames" in Claim 7 indefinite. This has been amended to read "input video image frames" throughout the claim, thus making it clear that these are not the "plurality" referred to in Claim 2.

In Claim 8, the operator console now outputs "operator command signals", thus correcting any inconsistency. This change also answers the question about the phrase "by the operator console". As requested, the word "coupling" used in reference to the system bus has been changed to "supplying".

The Examiner has a number of objections to Claim 9. Applicant believes that amended Claim 9 answers all these objections. The use of "image data" and "frames of image data" has been clarified. "Each corresponding", "repetitively retrieve", and "represented by a repetitively..." have each been rewritten.

Claim 10 has been extensively rewritten to satisfy the objections of the Examiner. Applicant believes amended Claim 10 to now be definite.

Applicant has amended Claims 11-14 along the lines discussed above. Applicant has further reviewed all the pending claims and has amended all the claims in light of the Examiner's 35 USC 112 objections. The applicant believes all the pending claims are now definite and satisfy the requirements of 35 USC 112. As Claims 2 and 3 are not rejected on any prior art basis, they are believed to be condition for allowance.

The Applicant's invention provides for an electronic still store system for storing, in an image store, a plurality of full resolution image frames and in response thereto,

storing a plurality of reduced spatial resolution image frames produced by a size reducer. The system has frame store which is capable of storing both a full resolution image frame and reduced spatial resolution image frame. The frame store additionally operates in two modes. In the first mode, both a full spatial resolution image frame is received from the image store to generate an output image frame. In the second mode, a plurality of reduced spatial resolution image frames are received from the image store to generate an output image frame.

The Examiner rejected Claims 1, and 4 through 14 under 35 U.S.C. 103 as being unpatentable over the publication by Hugh Boyd, Quantel.

Claim 1 has been cancelled and dependent Claims 4 and 5 have been amended to be dependent on Claim 2. Claim 6 remains dependent on Claim 5, Claim 7 remains dependent on Claim 6, and Claim 8 remains dependent on Claim 7. As Claim 2 was not rejected on the basis of any prior art and dependent Claims 4 through 8 add considerable detail, Claims 4 through 8 are believed to be in condition for allowance.

The Boyd publication discloses a system for the storage and retrieval of video image frames. The Boyd system does not teach the use of a frame store that is capable of storing both a full resolution image frame and a corresponding reduced spatial resolution image frame at the same time. Amended Claims 9 through 11 all require the use of such a frame store. Support for this amendment can be found generally throughout the specification and specifically in Claim 2. Thus the applicant believes that amended Claims 9 through 11 are in condition for allowance.

Claims 12 and 14 have been amended such that the operation of the size reducer in producing the reduced size image data set from the corresponding full size image data set is "in response" to the writing of the full size image data set into the frame store. Boyd clearly does not teach this responsive use of the size reducer. To perform such an operation with the Boyd system an operator would have to orchestrate each step. Thus the applicant believes that amended Claims 12 and 14 are patentably distinguishable over the Boyd disclosure.

Amended Claim 13 is dependent upon amended Claim 12 and adds considerable detail and thus is also believed to be in condition for allowance.

Claim 15 has been added to more precisely claim the applicant's inventive concept. Claim 15 calls for "a frame store coupled to selectively receive from either an external source or said image store and store one of said full size image data sets". Further the

"frame store is operable such that when a full size image data set is received from an external source or is received from said image store and said image store does not contain a corresponding reduced size image data set, said frame store outputs a copy of said full size image data set to said size reducer". This automatic use of the size reducer is clearly not taught by the Boyd publication. Again, this type of operation would require complete operator orchestration in the Boyd system. Support for this Claim can be found at least on page 3 of the specification. The applicant believes that Claim 15 is patentably distinguishable over the Boyd publication.

The Yamamoto et al reference, which was cited but not applied, does not appear to be pertinent to the claims.

In the event that this amendment does not place this application fully in condition for immediate allowance for any reason, a telephone interview is respectfully requested at the number listed below if the Examiner believes such an interview would be productive.

Respectfully submitted,
Daniel A. Beaulier

by Bradley A. Perkins
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January 28, 1986

C

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
06/740,297	05/31/85	BEAULIER D	AV-3033N1

AMPEX CORP.
401 BROADWAY, MS 3-35
REDWOOD CITY, CA 94063-3199

EXAMINER	
HARVEY, D	
ART UNIT	PAPER NUMBER
382	14

DATE MAILED: 05/23/86

This is a communication from the examiner in charge of your application
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☒ Responsive to communication filed on 1/30/86 ☒ This action is made final.

A shortened statutory period for response to this action is set to expire 3 (three) month(s), ____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☐ Notice of References Cited by Examiner, PTO-892.
2. ☐ Notice re Patent Drawing, PTO-948.
3. ☐ Notice of Art Cited by Applicant, PTO-1449
4. ☐ Notice of Informal Patent Application, Form PTO-152
5. ☐ Information on How to Effect Drawing Changes, PTO-1474
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☒ Claims 1-15 are pending in the application.
   Of the above, claims _____ are withdrawn from consideration.
2. ☒ Claim 4 has been cancelled.
3. ☐ Claims _____ are allowed.
4. ☒ Claims 2-15 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings which are acceptable for examination purposes until such time as allowable subject matter is indicated.
8. ☐ Allowable subject matter having been indicated, formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. These drawings are ☐ acceptable; ☐ not acceptable (see explanation).
10. ☐ The ☐ proposed drawing correction and/or the ☐ proposed additional or substitute sheet(s) of drawings, filed on _____ has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved. ☐ disapproved (see explanation). However, the Patent and Trademark Office no longer makes drawing changes. It is now applicant's responsibility to ensure that the drawings are corrected. Corrections MUST be effected in accordance with the instructions set forth on the attached letter "INFORMATION ON HOW TO EFFECT DRAWING CHANGES", PTO-1474.
12. ☐ Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

PTOL-326 (Rev. 7-82) EXAMINER'S ACTION

1. Claims 1-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-15 contain numerous section 112 problems such as not providing antecedent basis and the use of confusing language. The following changes exemplify some of the clarifications that are required.

In claim 2, line 2, "retrievable" should read --retrievably--. In line 10, "copies" should read --copies each at selectively located different positions--. In line 12, "having an image frame" should be deleted. In line 12, "a" should read --the stored--. In lines 13-14, "selectively located... output image frame" should be deleted. In line 15, "a full" should read --the stored full--. In line 16 "a" should read --a corresponding--. In line 18, "reduced spacial" should read --corresponding reduced spatial--. In line 18, "the full" should read --the stored full--.

In claim 4, line 2, "location" should read --different positions--. In line 4, "said" should read --said retrieved--.

In claim 5, line 3, "a" should read --the--. In line 5, "the placement of" should read --the different positions for--. In lines 6 and 7, "reduced spatial resolution... generated by the" should be deleted.

In claim 7, line 2, "analog" should read --input analog--. In line 4, "and converting" should read --input analog--. In line 5, "frame" should read

--frames--.

In claim 8, line 3, "a central" should read --the central--.

Claim 9 could be corrected if it read as follows:

--9. A video still store system comprising:

an image store for storing a first plurality of full size image data set representing a plurality of full size image frames and for storing a plurality of reduced size image data sets representing a plurality of reduced size image frames each of said reduced size image data sets corresponding to one of the full size image data sets;

an external source providing a second plurality of full size image data sets;

a size reducer coupled to receive, from a frame store capable of simultaneously storing both one of said full size image data sets and one of said reduced size image data sets, a stored one of said full size image data sets and which produces and returns to the frame store the corresponding reduced size image data set;

said frame store being coupled to selectively receive from either the external source or the image store and to store said one of said full size image data sets, to output as an output image frame the stored one of said full size image data sets, to communicate to the size reducer the stored one of said full size image data sets, to receive from the size reducer and to store the corresponding reduced size image data

set, to provide to the image store both the stored one of said full size image data sets and the corresponding reduced size image data set, to receive from the image store and to store at different selected locations selected ones of said plurality of reduced size image data sets, and to output as said output image frame the stored selected ones such that the selected ones are disposed at different locations within the output image frame;

a device which receives the output image frame and generates a television signal.--

Claims 10-15 require similar clarifications as exemplified above.

2. The applicant is asked to review the claims and to correct any section 112 problems similar to those exemplified above.

3. Claims 2-15 would be allowable if rewritten or amended to overcome the rejection under 35 U.S.C. 112.

The applicant is asked to update the present status of the copending application cited on page 5 of the disclosure.

4. Applicant's amendment necessitated the new grounds of rejection. Accordingly, THIS ACTION IS MADE FINAL. See MPEP 706.07(a).

Applicant is reminded of the extension of time policy set forth in 37 CFR 1.136(a). The practice of automatically extending the shortened statutory period an additional month upon the filing of a timely first response to a final rejection has been discontinued by the Office. See 1021 TMOG 35.

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS FINAL ACTION IS SET TO EXPIRE THREE MONTHS FROM THE DATE OF THIS ACTION. IN THE EVENT A FIRST RESPONSE IS FILED WITHIN TWO MONTHS OF THE MAILING DATE OF THIS FINAL

ACTION AND THE ADVISORY ACTION IS NOT MAILED UNTIL AFTER THE END OF THE THREE-MONTH SHORTENED STATUTORY PERIOD, THEN THE SHORTENED STATUTORY PERIOD WILL EXPIRE ON THE DATE THE ADVISORY ACTION IS MAILED, AND ANY EXTENSION FEE PURSUANT TO 37 CFR 1.136(a) WILL BE CALCULATED FROM THE MAILING DATE OF THE ADVISORY ACTION. IN NO EVENT WILL THE STATUTORY PERIOD FOR RESPONSE EXPIRE LATER THAN SIX MONTHS FROM THE DATE OF THIS FINAL ACTION.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Harvey whose telephone number is (703) 557-9165.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 557-3321.

DE Harvey:dli DH

4-25-86

(703) 557-9165

John W. Shepperd

JOHN W. SHEPPERD
PRIMARY EXAMINER
GROUP 260

D

Atty Dkt AMP0035PCON
AV-3033N1
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:
DANIEL BOULIER
Serial No.: unknown
Filed: unknown
For: ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION

Group Art Unit: 262
Examiner: D. Harvey

PRELIMINARY AMENDMENT

The Honorable Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

Please amend the file wrapper continuation application identified above as follows.

In the Specification

At page 1, line 11 after "may" and before "be", delete "than" and substitute --then--.

At page 2, line 25, delete "positioned reduce" and substitute --positioned, reduced--.

At page 5, line 1, delete "referred" and substitute --preferred--. At line 27, delete "fourth" and substitute --forth--.

At page 6, line 4, insert after "22" and before "is" --, which in the preferred embodiment is a random access memory,--. At line 8, after "24" and before "." insert --in the preferred embodiment but which can be any bulk storage memory device in other embodiments--

At page 7, line 9, delete "resolutioncopy" and substitute --resolution copy--. At line 16, delete "usedin" and substitute --used in--. At line 19, delete "continous" and substitute --continuous--.

At page 8, line 7, delete "take" and substitute --taken--. At line 6, after "array" and before "within" insert --as a mosaic which fits--.

In the Drawings

Please approve the drawing change marked on the enclosed sketch.

In the Claims:

Please cancel claim 1.

SUBI3

2. (Twice Amended) An electronic still store system comprising:

an image store means for [retrievable] retrievably storing therein a plurality of image frame copies of video frames [of video images], the image frame copies comprising data representing a full spatial resolution image [frame copy] and [a] corresponding data representing a reduced spatial resolution image [frame copy] of each frame of video [images] data;

a frame store means which is operable in a first mode [to receive and store] for receiving and storing one of said full spatial resolution images [frame copies] from [the] said image store means and for repetitively [generate] generating a full spatial resolution [output] image [frame] output and operable in a second mode [to receive] for receiving from the image store means and [store] storing a plurality of said reduced spatial resolution images [image frame copies] each at selectively located different positions, the frame store means being further operable in the second mode [to] for repetitively generating [generate a reduced spatial resolution] output

image [frame having an image frame] comprising [a] the stored plurality of said reduced spatial resolution images [image frame copies selectively located at different positions within the output image frame]; and

a size reducer means [coupled to receive] for receiving from the frame store [a] the stored full spatial resolution image [frame copy] and in response thereto [to return] returning to the frame store means a corresponding reduced spatial resolution image [frame copy] and wherein the frame store is operable [to receive and store] for receiving and storing the corresponding reduced spatial resolution image [frame copy] while continuing to store the stored full spatial resolution image [frame copy].

3. (Twice Amended) The electronic still store system according to claim 2 [above], wherein the corresponding reduced spatial resolution image [frame copies] each have a spatial resolution of [one-forth] one-fourth the spatial resolution of the corresponding full spatial resolution image [frame copies in each dimension].

4. (Twice Amended) The electronic still store system according to claim 2 [above], [further comprising] wherein said frame store means includes a central processing unit, controlled by an operator, coupled and operable in said first mode to select which of said [image frame copies] full spatial resolution images stored in said image store means are to be retrieved from the image store means and coupled and operable in said second mode to select which of said reduced spatial resolution images stored in said image store means are to be retrieved and stored in said frame store means and to select the [location] different positions within the frame store means at which each of

said retrieved [image frame copies] reduced spatial resolution images is stored.

Please cancel claim 5.

6. (Twice Amended) The electronic still store system according to claim [5 above] 4, wherein said frame store means further [comprising] comprises an output digital-to-analog converter coupled to receive [said] output image data [frames] from the [the] frame store means and in response thereto to generate an analog video signal representing ~~the received~~ an output image [frames]; and

a monitor coupled to receive the analog video signal and display the output image [frames] represented thereby.

7. (Twice Amended) The electronic still store system according to claim 6 [above], further comprising a video input means for generating an input analog video signal representing [a sequence of] an input video image [frames] and an analog-to-digital converter coupled between the video input means and the frame[s] store means [and] for converting the input analog video signal to a digital form [in which] such that digital data representing said input video image ~~frame~~ [can be] is received and stored by the frame store means.

Please cancel claims 8 through 14.

SUB I4

15. (Amended) A video still store system comprising:

a size reducer coupled to receive a full size image data set representing a full size image frame and to produce a reduced size image data set representing a corresponding reduced size image frame in response thereto;

an image store for storing a plurality of said full size image data sets representing a plurality of full size image frames and for storing a plurality of corresponding reduced size image data sets representing a plurality of reduced size image frames, each of said reduced size image data sets corresponding to one of said full size image data sets; and

a frame store means coupled to selectively receive from either an external source or said image store and store one of said full size image data sets, said frame store [is] being operable such that when a full size image data set is received from an external source or is received from said image store and said image store does not contain a corresponding reduced size image data set, said frame store outputs a copy of said full size image data set to said size reducer and [in response thereto] receives a corresponding reduced size image data set which is outputted to said image store for storage with the corresponding full size image data set.

Please add new claims 16-28.

SUB I4

16. An apparatus for storing video images as pixel data comprising:

means for receiving and storing in a first memory pixel data representing video images having a first resolution, and for generating from said pixel data representing said video image at said first resolution pixel data representing a corresponding image having a second, lower resolution and for storing said second resolution image data with said first resolution image data in a second memory; and

means for selectively accessing either said data for the image at its first resolution or only the

corresponding image data at said second resolution for any image stored in said bulk storage memory for further processing.

17. The apparatus of claim 16 wherein said means for selectively accessing allows access to a plurality of images at said second resolution and storage of them in selected blocks of memory in said first memory so that they may be further processed as a mosaic of reduced size images.

18. An apparatus for storing video pixel data representing video images of a first resolution and, for each image at a first resolution a corresponding video image at a second resolution comprising:

random access memory means for storing video pixel data representing a full size image at said first resolution and a corresponding reduced size version thereof at a second resolution;

means for storing one at a time in said random access memory means a plurality of said full size images;

memory means for receiving video pixel data from said random access memory means and for storing said full size images and the corresponding reduced size images received from said random access memory means and for outputting, upon a user's command, a selected full size image or only the corresponding reduced size image for the selected full size image for storage in said random access memory means;

means for generating said corresponding reduced size image from any said full size image in said random access memory means to be transferred to said memory means and for storing the video pixel data representing said reduced size image in said random access memory means prior to

storage of the contents of said random access memory means in said memory means.

19. An apparatus for storing video data as full size image and reduced size image of pixel data comprising:

random access memory means for storing video pixel data presented at an input port and having at least one output port;

means for storing video pixel data representing a full size video image at a first resolution in a first group of memory locations in said random access memory means;

bulk storage memory for storing video pixel data and for presenting selected blocks of video data at said input port for storage by said random access memory;

size reducing means coupled to said random access memory means for accessing said image video pixel data stored in said random access memory representing said full size image at said first resolution, and for reducing said image to a reduced size counterpart image at a second, lower resolution and for storing said reduced size image at said second resolution in said random access memory in a second group of storage locations therein; and

control means coupled to said random access memory means, said bulk storage means and to said size reducing means for causing said size reducing means to generate said reduced size image at said second resolution and to store same in said random access memory means in said second group of storage locations each time the video pixel data from said random access memory means is to be transferred to said bulk storage means for storage, and for causing the video pixel data from both said first and second plurality of memory locations in said random access memory means to be transferred to said bulk storage means for storage after said reduced size image is generated and

stored in said second group of storage locations, and for causing selective transfer of video pixel data from said bulk storage means into said random access memory means for storage such that either said first resolution image or only the reduced size second resolution counterpart are transferred into said random access memory means.

20. The apparatus of claim 19 wherein said control means also is coupled for causing selective transfer of said second resolution image directly from said size reducing means into said bulk storage means.

21. The apparatus of claim 19 wherein said control means also is coupled for controlling the memory locations in said random access memory means where the video pixel data defining said second resolution image are stored upon transfer from said bulk storage means.

22. The apparatus of claim 21 wherein said size reducing means produces said second resolution image with 1/16th the resolution of said first resolution image and wherein said control means is coupled for causing transfer of said second resolution image into said random access memory for storage at a selected one of 16 predetermined blocks of memory locations.

23. A system for storing and retrieving video data representing video images which are displayed as rasters of vertically distributed horizontal lines, each represented video image normally occupying a raster of selected vertical and horizontal size, the system comprising:

a video image size reducer having an input coupled to receive video data representing a video image

corresponding to a selected raster size and generate therefrom at an output video data representing a reproduction of said video image corresponding to a selected fractional-size of said selected raster size;

a first store having an input for receiving video data for storage and an output for providing video data retrieved from storage, said first store having a capacity for storing video data representing a video image corresponding to of the selected raster size together with video data representing a reproduction of a video image corresponding to the selected fractional-size of said selected raster size;

a second store having an input for receiving video data for storage and an output for providing video data retrieved from storage, said second store having a capacity for storing video data representing a plurality of video images each corresponding to a video frame of the selected raster size and video data representing the reproduction of each video image of selected fractional size of said selected raster size; and

means for selectively transferring from said first store to said second store either said video data representing a video image corresponding to the selected raster size or said video data representing a reproduction of a video image which is the selected fractional size of said selected raster size.

24. A method of storing video pixel data comprising:

receiving data for a full size image at a first resolution and generating therefrom data representing a reduced size reproduction image at a second, lower resolution;

storing both the full size and the reduced size image in a bulk storage medium; and

selectively accessing either the full size or said reduced size image from said bulk storage medium.

25. The method of claim 24 further comprising the steps of storing a plurality of full size images and their reduced size reproduction images and accessing a plurality of selected reduced size images and storing them in selected blocks of storage locations in a random access memory.

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26. The method of claim 24 wherein each full size image occupies upon display a raster of selected vertical and horizontal size, and further comprising the steps of storing a plurality of full size images and their reduced size reproduction images and accessing a plurality of selected reduced size images and storing them in a random access memory and outputting the group of stored reduced size reproduction images as a mosaic of reproduction images occupying a raster of the selected vertical and horizontal size.

27. A method of storing video pixel data comprising:

receiving and storing in random access memory video pixel data comprising a full size image;

generating therefrom video pixel data representing a reproduction thereof in the form of a reduced size image at a lower resolution from the full size image data and storing the pixel data representing the reduced size image so generated in additional storage locations in said random access memory along with the full size image;

storing both the full size and the reduced size image in bulk storage memory;

selectively transferring either the full size image or the reduced size image from said bulk storage memory means

into said random access memory means for further processing.

28. A video still store system comprising:

an image store for storing full size image data sets representing a plurality of full size images and for storing a plurality of reduced size image data sets representing a plurality of reduced size images, each of said reduced size image data sets corresponding to one of the full size image data sets;

an external source input for receiving from an external source full size image data sets;

a memory for simultaneous storage of one of said full size image data sets and the corresponding one of said reduced size image data sets;

a size reducer means for receiving from said memory the stored one of said full size image data sets, and for producing and returning to said memory the corresponding reduced size image data set;

said memory being coupled and operative to selectively receive from either the external source input or the image store and to store said one of said full size image data sets, and to output as an output image the stored one of said full size image data sets, and to communicate to the size reducer the stored one of said full size image data sets, and to receive from the size reducer and to store the corresponding reduced size image data set, and to provide to the image store both the stored one of said full size image data sets and the corresponding reduced size image data set, and to receive from the image store and to store at different selected locations selected ones of said plurality of reduced size image data sets, and to output as said output image the stored selected ones such that the selected ones are disposed at different locations

within the output image or to receive and store from said image store only a full sized image data set; and

means to retrieve data from said memory and display it on a raster scanned video display.

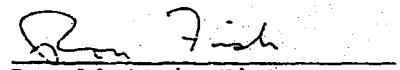
REMARKS

The undersigned thanks the Examiner for the courtesy of the telephone interview conducted during the prosecution of the parent to the above identified case. In response to the discussions therein of new claims written by the undersigned, said new claims are submitted herewith for examination based on the substance of the interview. Further, some of the now pending claims have been retained and amended to eliminate the problems under 35 U.S.C. Section 112 noted in the outstanding office action. New claim 28 is the Examiner's suggested rewrite of claim 9 with some minor changes in terminology and one additional element.

New claims 16 through 28 are in accord with the novelty identified by the Examiner in the first Office Action in the parent of the above identified U.S. patent application. Based upon the content of the Hugh Boyd, Quantel reference, which teaches accessing from disk the entire full size picture before size reduction can occur, these new claims are believed to be allowable. This is so because they teach storing a reduced image with the full size image each time a full sized image is to be stored from the frame buffer to the disk. This allows the user the option of retrieving the entire full size image or only the reduced size counterpart from disk. Mosaics of reduced size counterpart images may be made by accessing several reduced size images and moving them around in the frame buffer. The access time for each reduced size image

is only a fraction of the access time for the entire full size image. This system obviously has a major advantage over the Boyd, Quantel system in that access time for a frame comprised of one or more reduced images will be substantially shorter than the Boyd, Quantel system can provide. This is because the Boyd, Quantel reference does not store a reduced image automatically with the full size counterpart each time a full size image in the frame buffer is to be stored on disk. Thus to access any particular reduced image, the entire full size image must be accessed and loaded into the size reducer. Clearly this takes more time than accessing only the data describing the reduced size image from the disk.

Respectfully submitted,
CIOTTI & MURASHIGE

By 
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